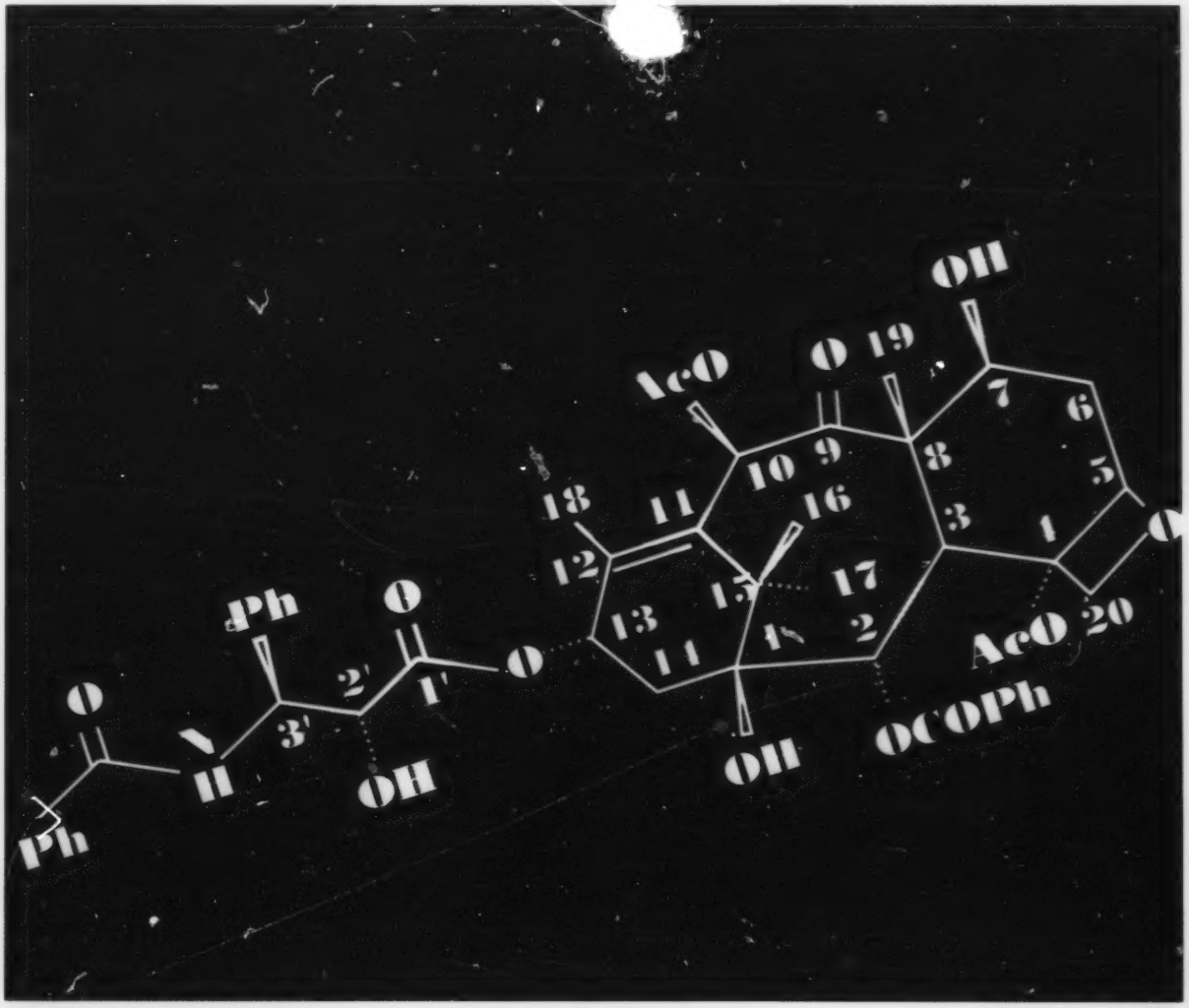
The yews and taxol: a bibliography (1970–1991)

Pacific and Yukon Region — Information Report BC-X-338

A.K. Mitchell



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The Pacific Forestry Centre undertakes research in response to the needs of the various managers of the forest resource. The results of this research are distributed in the form of scientific and technical reports and other publications.

About the Author

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Cover: The taxol molecule superimposed on a silhouette of Pacific yew (*Taxus brevifolia*).

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Abstract

Current interest in taxol, the promising anti-cancer agent isolated from yew bark, has focused attention on yew trees. The demand for raw material has raised questions about the sustainable development of the resource and threatens the survival of natural stands of yew in the Pacific northwest. References collected here provide a basis for new studies of taxol production, and the genetic and ecological conservation and regeneration of yews.

Studies on yew during the 1970s addressed three diverse problems: 1) toxicology and diagnosis of yew poisoning in livestock 2) cultivation and horticultural use of *Taxus* species and 3) ecology and the distribution of *Taxus* species in nature. These studies were the foundation of our knowledge of the phytochemistry, silviculture, and biology of yews.

In the 1980s, concern over the damaging effects of air pollution on ecosystems brought the three research initiatives together. The yew was studied because its longevity makes it an excellent long-term indicator of change. The previous phytochemical work enabled the characterization of toxic substances in the plants, horticultural studies provided information on the silvics of the species, and inventories enabled an assessment of pollutant effects on plant survival and distribution.

This bibliography lists over 300 references published between 1970 and 1991 and includes many foreign language articles. It is divided into eight sections, each of which is subdivided into subject areas. Citations are arranged chronologically to present a historical perspective. Keywords are included where possible. The bibliography is followed by a list of *Taxus* species and varieties and an index of articles pertinent to the Pacific northwest and the taxol issue. This bibliography will provide readers with a ready reference to two decades of research that will assist new investigations on the sustainable development of natural sources of taxol, the biology of this relatively little-known genus, the issue of *Taxus* species as an element of biodiversity, or other concerns.

Résumé

L'intérêt soulevé actuellement par le taxol, un agent prometteur de lutte contre le cancer isolé à partir de l'écorce d'if, a fait converger l'attention vers cette essence. La demande pour cette matière première, qui a fait naître des questions sur le développement durable de cette ressource, constitue une menace pour la survie des peuplements naturels d'ifs dans la région nord-ouest du Pacifique. La bibliographie présentée ci-après prépare le terrain en vue de la tenue de nouvelles études sur la production du taxol de même que sur la conservation des ressources génétiques et écologiques et la régénération des ifs.

Pendant les années 70, les études sur les ifs ont abordé trois types de problèmes, soit 1) la toxicologie et le diagnostic d'une intoxication du bétail par l'if, 2) la culture et les utilisations horticoles des essences de *Taxus* et 3) l'écologie et la répartition des essences de *Taxus* dans la nature. Ces études sont à la base de nos connaissances sur la phytochimie, la sylviculture et la biologie des ifs.

Pendant les années 80, les préoccupations soulevées par les effets dommageables de la pollution atmosphérique sur les écosystèmes ont entraîné la fusion de ces trois initiatives de recherche. L'if a été étudié car sa longévité en fait un excellent indicateur à long terme du changement. Les travaux phytochimiques antérieurs ont permis de caractériser les substances toxiques de cette espèce végétale, des études horticoles ont fourni des données sur l'écologie forestière de l'essence, et les inventaires effectués ont permis d'évaluer les effets des polluants sur son taux de survie et sa répartition.

Cette bibliographie énumère plus de 300 documents publiés entre 1970 et 1991 et comporte de nombreux articles en langue étrangère. Elle est divisée en huit sections qui sont elles-mêmes subdivisées par domaine. Les titres cités sont présentés par ordre chronologique afin de donner une perspective historique. Des mots clés sont présentés lorsque c'est possible. La bibliographie est suivie d'une liste des essences et des variétés de *Taxus* et d'un index des articles sur le taxol et la région nord-ouest du Pacifique. Cette bibliographie fournira aux lecteurs un guide de référence rapide sur deux décennies de recherches qui contribuera à la tenue de nouvelles études sur le développement durable des ressources naturelles en taxol, sur la biologie de ce genre relativement peu connu, sur la contribution des essences de *Taxus* à la biodiversité et sur d'autres sujets.

Introduction

Clinical testing of taxol, the promising anti-cancer agent isolated from yew bark, has stimulated massive research and development programs in the United States, France and elsewhere that are aimed at the aquisition of the raw material from yew trees and the extraction, purification, and synthesis of taxol and its analogues.

The search for effective life-prolonging drugs is not new. Among 35 000 plant species tested by the United States National Cancer Institute, many extracts have revealed anticancer activity but none proved to be safe for routine use, with the possible exception of one. In 1966, Monroe Wall, a chemist in North Carolina, tried to interest the National Cancer Institute in a new substance called taxol, extracted from the bark of Pacific yew (*Taxus brevifolia* Nutt.). Taxol had the most promising suppression of tumour cells he had ever seen. Wall even described the molecular structure in a 1971 paper, but the National Cancer Institute wasn't interested and Wall gave up without patenting taxol.

In 1977 there was a breakthrough. The anti-tumor activity so elegantly demonstrated in the laboratory by Wall was confirmed by results from a study in which taxol was found to dramatically suppress tumours in living mice. In 1979, its unique mode of action was published by a team of New York pharmacologists and taxol was finally noticed by the National Cancer Institute. Human trials began in 1983, and despite a few deaths caused by unforseen allergic reactions that resulted from the form in which the drug was administered, testing continued. In 1989, a landmark study conducted at the Johns Hopkins University in Baltimore showed great promise in women with prevously incurable ovarian cancer. This leu to the National Cancer Institute issuing a contract with Bristol Meyers-Squibb, a pharmaceutical company based in the United States, for clinical development of taxol.

Although taxol is found in all species and varieties of yew, current interest has been focused on the Pacific yew because natural stands in the Pacific northwest may represent the largest currently available source of bark. Bristol-Meyers Squibb plans to obtain some 158 000 kg of dried bark from British Columbia. This has raised concerns that an important source of the raw material will be irreparably damaged through unsustainable exploitation.

Pacific, or western, yew is widely distributed in coastal and interior British Columbia, but seldom forms pure stands and is usually found scattered through the understorey. Trees are either male or female (dioecious), and the seed is characterized by a red fleshy aril that gives it the appearance of a berry. Foliage is usually dark green and the needle-like leaves are flat, sharp-pointed and 2-3 cm long. The shoots are also green. The bark is thin, scaly and dark reddish or purplish. The foliage and the seeds, in particular, are poisonous.

This survey of the literature on Taxus and taxol shows that there have been three major research areas since 1970: phytochemistry and toxicity of yew foliage, including taxol; horticulture, cultivation and propagation by cuttings, including pathology; and species distribution and biology, including physiology and ecology, and seed production and dormancy. Little is known about native North American yews. Of the over 300 articles surveyed, 11 were on Pacific yew and 11 on Eastern yew (*Taxus canadensis*). The majority of references pertain to the English yew (*Taxus baccata*) and its hybrids.

This bibliography lists over 300 references related to taxol, Pacific yew, and the genus *Taxus*. A few publications prior to 1970 have been included to provide a historical perspective.

To highlight major research initiatives, citations are divided into eight major subject areas. Within each subject area, references are further broken into specific topics that show the scope of the previous work. The number of citations in each major and specific subject area is found in the table of contents and provides an indication of the extent of the research in each. References within the specific subject areas are arranged in chronological order to highlight current research initiatives. Also included is a list of species and varieties of *Taxus* and their hybrids and an index of articles pertaining to native North American yews, the Pacific Northwest, and the taxol issue.

1. CULTIVATION

1.1 Cuttings

1.1.1 Eccher, T. 1988. Response of cuttings of 16 *Taxus* cultivars to rooting treatments. Acta Hortic. 227:251-253. (English)
Keywords: *Taxus baccata*, *Taxus media*, *Taxus cuspidata*, cultivars, cuttings, position, shoots, rooting capacity, cuttings treatment, IBA, vegetative propagation.

1.1.2 Bassulk, N.; Maynard, B. 1988. Banded Cuttings: excluding light stimulates root formation. Fine Gardening 1: 43-45. (English)

1.1.3 Richey, M. 1986. Sticking *Taxus* as unstripped cuttings, an update. Comb. Proc. Int. Plant Propagators Soc. 36:597-599. (English)
Keywords: *Taxus*, cuttings, plant propagation, rooting.

1.1.4 Gouveia, R.J. 1984. Rooting cuttings in outdoor mist beds. Comb. Proc. Int. Plant Propagators Soc. 34:537-539. (English)
Keywords: *Thuja*, *Taxus*, *Juniperus*, cuttings, rooting, misting.

1.1.5 Shugert, R. 1982. Cold treatment of *Taxus* cuttings. Comb. Proc. Int. Plant Propagators Soc. 32:609-612. (English)

1.1.6 Lazar, M.; Teodoreanu, E. 1980. Influence of auxin (IAA) and alar (B9) on rhizogenesis in cuttings of *Taxus baccata* L. Contrib. Bot. Univ. Babes Bolyai Gradina Bot. 1980:273-276. (Romanian; French summary)

1.1.7 Riekstins, I. 1980. Propagation of *Taxus baccata* by cuttings. Latvijas Republikaniskais zinatniski tehniskas informacijas un propagandas instituts. 1:35-40. (Latvian; Russian summary)

1.1.8 Ahrens, J.F. 1979. Cuttings from herbicide-treated nursery stock—what can we expect? Cultivars of *Taxus*, *Juniperus*, *Rhododendron*, *Leucothoe* and *Pieris*. Comb. Proc. Int. Plant Propag. Soc. 29:348-357. (English)

1.1.9 Kausch von Schmeling, W. 1978. Furthering the propagation of *Sorbus torminalis* and yews (*Taxus*). Mitt. Dtsch. Dendrol. Ges. 70:177-181. (German)

1.1.10 Van Hoff, E. 1978. Rooting *Taxus* cuttings with no heat. Comb. Proc. Int. Plant Propag. Soc. 28:514-516. (English)

1.1.11 Hull, R.J.; McGuire, J.J.; Wyman, R.D. 1977. Rooting capacity of herbicide-treated woody ornamental plants (*Ilex crenata*, *Rhododendron*, *Taxus media*). Weed Sci. 25(5):452-455. (English)

1.1.12 Mitchell, C.D.; Smith, E.M. 1977. Effect of stock plant nitrogen fertilization on the rooting response of *Taxus cuspidata* 'Thayer'. Ohio Agric. Res. Dev. Cent. Res. Circ. 226:47. (English)

1.1.13 Scheer, C. 1976. *Taxus* propagation by cuttings. Comb. Proc. Int. Plant Propag. Soc. 26:173-174. (English)

1.1.14 Sabo, J.E. 1976. Propagation of *Taxus* in northern Ohio. Comb. Proc. Int. Plant Propag. Soc. 26:174-176. (English)

1.1.15 Verkade, G. 1976. Propagation of *Taxus* by cuttings. Comb. Proc. Int. Plant Propag. Soc. 26:177. (English)

1.1.16 Von Kornya, J.P. 1976. Propagation of *Taxus* cuttings. Comb. Proc. Int. Plant Propag. Soc. 26:178-179. (English)

1.1.17 Ruppert, D.C. 1974. Hormone concentrations for propagating from softwood cuttings (*Euonymus*, *Taxus*). Comb. Proc. Int. Plant Propag. Soc. 24:349-350. (English)

1.1.18 Snyder, W.E.; Hess, C.E. 1956. Low temperature storage of rooted cuttings of nursery crops. Proc. Am. Soc. Hortic. Sci. 67:545-548. (English)
Keywords: *Teucrium chamaedrys*, *Taxus cuspidata*, *Juniperus communis*, *Thuja occidentalis*, rooting, cuttings, cold storage, survival, growth.

1.2 Herbicides

1.2.1 Ahrens, J.F. 1986. Fall vs. spring applied herbicides in *Taxus*. Proc. Annu. Meet. Northeast Weed Sci. Soc. 40:249-252. (English)
Keywords: *Taxus media*, oxadiazon, oxyfluorfen, herbicide sequences.

1.2.2 Davis, G.; Minton, R. 1982. Herbicide efficacy and phytotoxicity on thirteen selections from *Euonymus*, *Juniperus*, *Taxus*, *Thuja*, *Viburnum*, *Magnolia* and *Ilex*. Proc. Res. Conf. Annu. Rep. South Nurserymen's Assoc. 27th:272-277. (English)

1.2.3 Ahrens, J.F. 1980. Effects of surfactant or preemergence herbicides on the selectivity of asulam and glyphosate for control of *Panicum dichotomiflorum* and *Chenopodium album* in woody plants. Proc. Annu. Meet. Northeast Weed Sci. Soc. 34:330-333. (English)
Keywords: *Juniperus* spp., *Taxus* spp., phytotoxicity.

1.2.4 Frank, J.R.; King, J.A. 1979. Metolachlor and alachlor for weed control in establishing woody nursery stock *Taxus cuspidata* compacta, *Rhododendron* spp., *Ilex crenata*, *Juniperus horizontalis* plumosa. Proc. Annu. Meet. Northeast Weed Sci. Soc. 33:228-231. (English)

1.2.5 Raker, R.J. 1978. Evaluation of herbicides for control of yellow nutsedge (*Cyperus esculentus*) on nursery fields (*Taxus media*). Ohio Agric. Res. Dev. Cent. Res. Circ. 236:51-52. (English)

1.2.6 Ahrens, J.F. 1974. Fall applications of herbicides for control of quackgrass and yellow nutsedge in *Taxus cuspidata* capitata. Proc. Annu. Meet. Northeast Weed Sci. Soc. 28:379-385. (English)
Keywords: *Agropyron repens*, *Cyperus esculentus*.

1.2.7 Carpenter, P.L. 1972. Dicamba injury to *Taxus cuspidata*. Hortscience 7(6):573. (English)

1.2.8 Danielson, L.L.; May, C. 1969. Effects of several herbicides on yews and Japanese maples. Weed Sci. 17(2):142-144. (English)
Keywords: *Taxus media*, *Acer palmatum*, bibliography.

1.3 Horticulture

1.3.1 Creech, J.L. 1984. Japanese yew is essential to garden design. Am. Nurseryman. 160(2):51-52. (English)
Keywords: *Taxus cuspidata*, natural flora, cultivars, geographical distribution, Japan.

1.3.2 Davis, R.H. 1984. Pruning evergreen shrubs (*Juniperus* species, *Taxus* species, *Tsuga* species). Horticulture 62(11):18-19. (English)

1.3.3 Goddard, H.S.W. 1978. Three ways to prune yews (*Taxus*). Flower and Gard. West Ed. 22(8):18-19. (English)

1.3.4 Busca-Isusi, J.M. 1975. The yew (*Taxus*), another forgotten ornamental tree. Parques Jard. 15:11-13. (Spanish)

1.3.5 Lewis, C.E. 1975. Using *Taxus* in the landscape. Am. Nurseryman 143(2):8-9. (English)

1.3.6 Lewis, C.E. 1975. Using *Taxus* in the landscape Am. Nurseryman 143(2):69-72. (English)

1.3.7 Buscher, F.K. 1971. Pruning *Taxus* and Juniper. Ohio Agric. Res. Develop. Cent. Res. Sum. 56:49-50. (English)

1.3.8 Smith, E.M. 1971. *Taxus* in the landscape. Ohio Agric. Res. Dev. Cent. Res. Summ. 56:45-46. (English)

1.3.9 Everett, T.H. (ed.). 1960. *Taxus*: the yews. New Illustrated Encyclopedia of Gardening. Volume 12. Greystone press. N.Y. pp. 2249-2256. (English)

Keywords: Species, Varieties, growth habit.

1.4 Nursery culture

1.4.1 Lumis, G.P.; Johnson, A.G. 1983. Response of container-grown 'Hicks' yew to preplant chilling and postplant night lighting (*Taxus* X *media*). Hortscience 18(4):438-439. (English)

1.4.2 Smith, E.M.; Treaster, S.A. 1982. Growth of *Taxus cuspidata* "Thayeri" produced in containers. Ohio Agric. Res. Dev. Cent. Res. Circ. 268:3-5. (English)

1.4.3 Fretz, T.A.; Gilliam, C.H.; Sheppard, W.J.; Poole, H.A. 1981. Fly ash as a medium amendment for container grown ornamentals *Cotoneaster dammeri*, *Taxus* X *media*. Ohio Agric. Res. Dev. Cent. Res. Circ. 263:7-10. (English)

1.4.4 Pecknold, P.C. 1977. Controlling yew (*Taxus*) dieback through preventive and corrective measures. Am. Nurseryman 146(9):11. (English)

1.4.5 Pecknold, P.C. 1977. Controlling yew (*Taxus*) dieback through preventive and corrective measures. Am. Nurseryman 146(9):121-122. (English)

1.4.6 Smith, E.M.; Theil, G.A.; Mitchell, C.D. 1978. An investigation into the cause of conifer (*Taxus media*, *Thuja occidentalis*) damage in nursery storage: Injury due to plant spacing. Ohio Agric. Res. Dev. Cent. Res. Circ. 236:21-23. (English)

1.5 Nursery propagation cost

1.5.1 Kneen, H.H.; Taylor, R.D.; Smith, E.M.; Hahn, D.E.; Uchida, S. 1987. Costs of producing slow-growing evergreens (*Taxus*) in the field by size of firm in Ohio. Ohio Agric. Res. Dev. Cent. Res. Circ. 291:37-44. (English)

1.5.2 Kneen, H.H.; Taylor, R.D.; Hahn, D.E.; Smith, E.M. 1984. Annual costs of producing slow-growing evergreens (*Taxus*) differentiated by size of firm in Ohio. Ohio Agric. Res. Dev. Cent. Res. Circ. 279:45-49. (English)

1.5.3 Kneen, H.H.; Taylor, R.D.; Hahn, D.E.; Smith, E.M. 1983. Annual costs of producing slow growing evergreens (*Taxus*) differentiated by size of firm in Ohio. Ohio State Univ. Dep. Agric. Econ. Rural Soc. 1045:1-11. (English)

1.6 Patents

1.6.1 Franz, L.W. 1988. Yew named Gwen. Plant Pat. US Pat. Trademark Off. 6217:1-2 (English)
Keywords: *Taxus media*, cultivars, patents, planting stock, cuttings, winter hardiness, USA.

1.6.2 Van Heiningen, D. 1983. Wilton Pyramidal Hybrid yew tree *Taxus cuspidata*, male plant, slow rate of growth, varieties, USA. Plant Pat. US Pat. Trademark Off. 5075:1-3 (English)

1.6.3 Doren, R.F. 1976. 'Richard Horsey' *Taxus hunnewelliana*, a new cultivar. Hortscience 11(5):518-519. (English)

1.6.4 Youdath, J.A. 1975. Yew tree (*Taxus media* hicksi, patents, cultivar Springold). Plant Pat. US Pat. Trademark Off. 3697:1 (English)

1.7 Taxonomy

1.7.1 Khan, N. ud din; Parveen, N. 1987. The constituents of the genus *Taxus*. J. Sci. Ind. Res. 46(11):512-516. (English)
Keywords: Literature review, *Taxus* species, chemical constituents of plants, chemotaxonomy.

1.7.2 Nelson, E.C. 1981. The Irish yew *Taxus*. The Garden 106(10):429-431. (English)

1.7.3 Baldwin, I.; Stanley, J. 1978. *Taxus* production in the USA Varieties. Gardners' Chronicle (the horticultural trade journal) 184(22):13-14. (English)

1.7.4 Hekele, S. 1977. Yews (*Taxus* sp.) in the Bila Lhota arboretum (Litovel). Ziva 25(6):205-206. (Czech)

1.7.5 Chadwick, L.C.; Keen, R.A. 1977. The best of the yews (*Taxus*). Brooklyn Bot. Gard. Rec. Plants. 32(4):39-43. (English)

1.7.6 Bugala, W. 1975. The yew (*Taxus* L.): systematics and variability. Nasze. Drzewa. Lesn. 3:18-38. (Polish; English summary)

1.7.7 Schneider, J. 1973. Subfamily Taxoideae, tribe Taxeae, genera *Taxus*, *Torreya*; tribe Cephalotaxeae, etc. Rev. Hort. Suisse 46(4):80-83. (French)
Keywords: Culture.

2. Ecology

2.1 Community ecology

2.1.1 Bolsinger, C.L.; Jaramillo, A.E. 1990. *Taxus brevifolia* (Nutt.) Pacific Yew. *in* R.M. Burns and B.H. Honkala (tech. coords.) Silvics of North America: 1. Conifers. U.S.D.A. For. Serv. Agric. Handbk. 654. Washington, D.C. pp. 573-579. (English)

2.1.2 Mitchell, F.J.G. 1990. The history and vegetation dynamics of a yew wood (*Taxus baccata* L.) in S.W. Ireland. New Phytol. 115(3):573-577. (English)
Keywords: *Taxus baccata*, forest types, palynology, paleoecology, radiocarbon dating, habitat destruction, regeneration, woodlands, Ireland, Killarney National Park, Reenadinna wood.

2.1.3 Sobko, V.G.; Chuprina, P.I.A. 1985. Adaptation range of *Taxus baccata* in nature and under cultivation. Introd. Akklim. Rast. 4:36-37. (Russian)
Keywords: *Taxus baccata*, plant ecology, introduced species, adaptation.

2.1.4 Crawford, R.C.; Johnson, F.D. 1985. Pacific yew dominance in tall forests, a classification dilemma. Can. J. Bot. 63(3):592-602. (English; French summary)
Keywords: *Taxus*, habitats, dominant species, forest ecology, synecology, classification, terminology, Idaho, forests, mountain areas, *Taxus brevifolia*, rocky mountains, Nezperce National Forest.

2.1.5 Crawford, R.C. 1983. Pacific yew community ecology in north-central Idaho with implications to forest land management. Unpubl. Ph.D. dissertation. University of Idaho, Moscow, ID. 10[illegible] pp.

2.1.6 Krajina, V.J.; Klinka, K.; Worrall, J. 1982. Distribution and ecological characteristics of trees and shrubs of British Columbia. Dept. of Botany and Faculty of Forestry, The University of British Columbia, 2075 Wesbrook Mall, Vancouver, B.C. V6T 1W5. J & M Publishing, Vancouver, B.C. pp. 74-75. (English)

2.1.7 Leuthold, C. 1980. The ecological and phytosociological situation of the yew-tree (*Taxus baccata*) in Switzerland. Eidgenossische Technische Hochschule. Geobotanisches Institut. Veroffentlichungen. no. 67. 217 p. (German; English summary)
Keywords: Monograph, bibliography.

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8. Toxicology

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Appendix I.

Species and varieties of *Taxus*:

This catalog is not complete. Listed are some of the more common varieties and their growth forms to enable the reader to distinguish between some of the more often planted species of yew. More detailed lists can be found in Hartzell (1991), (reference no. 7.3.2.)

1. Species of *Taxus*.

T. brevifolia Nutt.	Pacific yew
T. canadensis Marsh.	Canadian yew
T. baccata L.	English yew
T. cuspidata (Sieb.) Zucc.	Japanese yew
T. chinensis (Pilg.) Rhed.	Chinese yew
T. floridiana (Nutt.) Chapm.	Florida yew

2. Varieties of *Taxus*.

2.1 The Japanese yew varieties.

T. cuspidata (Sieb.) Zucc.	Japanese yew propagated from cuttings
T. cuspidata capitata:	*T.* cuspisdata from seeds (upright form)
T. cuspidata nana:	Fast growing hedge variety
T. cuspidata brevifolia:	A nursery name for *T. cuspidata* nana
T. cuspidata fastigiata:	Dwarf, erect, columnar form
T. cuspidata aurea:	Yellow variegations
T. cuspidata aurescens:	Bright yellow leaves
T. cuspidata densa:	Shrub with dark green leaves
T. cuspidata nigra:	Very dark green leaves
T. cuspidata ovata:	Broader than normal leaves
T. cuspidata pyramidalis:	Pyramidal form
T. cuspidata Thayerae:	Spreading variety with feathery branches

2.2 The English yew varieties.

T. baccata L.	English yew
T. baccata repandens:	Prostrate bluish-green form
T. baccata Dovastonii:	Horizontal branches and pendent branchlets
T. baccata gracilis:	Weeping side branches
T. baccata lutea:	Aril is golden

2.2.1 Compact forms

T. baccata eparicoides
T. baccata ericiodes
T. baccata expansa
T. baccata Foxii

2.2.2 Golden-leaved forms

T. baccata adpressa	Compact with short dark green leaves
T. baccata adpressa aurea	Golden leaves
T. baccata adpressa argentea	White and green leaves
T. baccata aurea	
T. baccata Barronii	
T. baccata Dovastonii	
T. baccata aureo-variegata	All golden-leaved
T. baccata elegantissima	
T. baccata semperaurea	

2.3 The Irish yews.

T. baccata stricta:The Irish yew.

T. baccata stricta fastigiata	Stiff erect form
T. baccata stricta fastigiata aurea	Golden leaves
T. baccata stricta fastigiata grandis	Golden leaves
T. baccata stricta fastigiata Standishii	Golden leaves
T. baccata stricta fastigiata argentea	Silver variegated

2.4 The Hybrids

T. media Rhed. (*T. baccata* X *T. cuspidata*)

T. media Hatfieldii	Shrubby conical form
T. media Hicksii	Erect dark green branching form
T. media Kelseyi	Erect dense heavily fruiting form
T. media pyramidalis	Erect loose branching form
T. media Andersonii	Erect freely branching form
T. media Wardii	Erect and compact form
T. media Brownii	Erect conical form up to 2 m tall
T. media Wellesleyi	Erect broad form

From: *Taxus*: the yews. 1960. T.H. Everett, ed. New Illustrated Encyclopedia of Gardening. Volume 12. Greystone press. N.Y. Pages 2249-2256.

Appendix II.

Index of references pertinent to the Pacific Northwest.

Topic	Reference numbers
British Columbia:	
Taxol issue	7.1.1, 7.1.4, 7.1.7
Sustainability	7.2.1, 7.2.2, 7.2.3
Taxol:	
Clinical aspects	7.3.1, 7.3.7, 7.3.8, 7.4.6, 8.2.20
Taxol analogs	7.3.2, 7.3.3, 7.3.5, 7.3.6, 7.4.9
Mode of action	7.4.3, 7.4.6, 7.4.8
***Taxus brevifolia*:**	
Ecology	2.1.1, 2.1.4, 2.1.5
Distribution	2.4.1
Paleobotany	2.7.1
Ethnobotany	7.6.3, 7.6.4
Taxol	7.3.2, 7.3.3, 7.3.6, 7.4.6
***Taxus canadensis*:**	
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Old trees	2.5.4
Reproductive biology	3.2.1, 3.2.2, 3.2.3
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